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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,094	05/17/2006	Laurent El Ghaoui	03916.0043.PC/US01	8148
27194 7590 10/29/2008 HOWREY LLP-CA C/O IP DOCKETING DEPARTMENT 2941 FAIRVIEW PARK DRIVE, SUITE 200 FALLS CHURCH, VA 22042-2924				
EXAMINER SMITH, CAROLYN L				
ART UNIT		PAPER NUMBER		
1631				
MAIL DATE		DELIVERY MODE		
10/20/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/568,094

Applicant(s)

EL GHAOU ET AL.

Examiner

Carolyn Smith

Art Unit

1631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-30 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 15-30 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 09 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 02092006/08082007
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Applicants' election of Group III (claims 15-19), filed 7/22/08, is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Cancelled claims 1-14 and new claims 20-30, filed 7/22/08, are acknowledged. It is noted that Applicant states on page 5 of Remarks, filed 7/22/08, that claim 14 is cancelled and then recites three paragraphs of how claim 14 has been amended. It is assumed that Applicant was actually referring to claim 15, not claim 14. Applicant then recites that claim 15 has been amended. It is assumed that Applicant was actually referring to claim 16, not claim 15. The status identifier for claim 18 recites "original"; however, the correct status identifier is "currently amended". On page 6 of the Remarks by Applicant, filed 7/22/08, the last paragraph states that claims 1-13 are cancelled. It is assumed that Applicant meant to state that claims 1-14 were cancelled in order to be consistent with the list of claims and with the remarks in the second paragraph of page 5. If any of these assumptions are deemed incorrect by Applicant, please clarify what was meant.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The present title is directed to an apparatus and method for classifying multi-dimensional biological data, whereas in contrast the elected claims are specifically directed to a computer-based method and computer readable medium for deriving a linear classifier for classifying a test gene expression dataset.

Drawings, filed 2/9/06, are accepted by the Examiner.

The information disclosure statements, filed 2/9/06 and 8/8/07, have been considered by the Examiner.

Claims herein under examination are 15-30.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 15-30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 15-17 and 20-24 are drawn to a process that includes embodiments that are entirely mental steps. The United States Court of Appeals for the Federal Circuit ruled in *In Re Stephen W. Comiskey* (84 USPQ2d 1670 (Fed. Cir. 2007)) that claimed subject matter drawn to mental steps were not eligible subject matter under 35 U.S.C. 101, and provided basis for the ruling as follows:

The Supreme Court has reviewed process patents reciting algorithms or abstract concepts in claims directed to industrial processes. In that context, the Supreme Court has held that a claim reciting an algorithm or abstract idea can state statutory subject matter only if, as employed in the process, it is embodied in, operates on, transforms, or otherwise involves another class of statutory subject matter, i.e., a machine, manufacture, or composition of matter. 35 U.S.C. §101. As the PTO notes, “[t]he Supreme Court has recognized only two instances in which such a method may qualify as a section 101 process: when the process ‘either [1] was tied to a particular apparatus or [2] operated to change materials to a ‘different state or thing.’” See PTO Supp. Br. 4 (quoting *Flook*, 437 U.S. at 588 n.9). In

Diehr, the Supreme Court confirmed that a process claim reciting an algorithm could state statutory subject matter if it: (1) is tied to a machine or (2) creates or involves a composition of matter or manufacture.¹² 450 U.S. at 184.

There, in the context of a process claim for curing rubber that recited an algorithm, the Court concluded that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.” *Id.* (quoting *Benson*, 409 U.S. at 70);¹³ see also *In re Schrader*, 22 F.3d 290, 295 [30 USPQ2d 1455] (Fed. Cir. 1994) (holding when a claim does not invoke a machine, “§101 requires some kind of transformation or reduction of subject matter”). Thus, a claim that involves both a mental process and one of the other categories of statutory subject matter (i.e., a machine, manufacture, or composition) may be patentable under §101. See *Diehr*, 450 U.S. at 184 (holding a process that involved calculations using the “Arrhenius equation” patentable because the claim “involve[d] the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing”). For example, we have found processes involving mathematical algorithms used in computer technology patentable because they claimed practical applications and were tied to specific machines.¹⁴

¹² Of course, process claims not limited to claiming an abstract concept or algorithm (i.e., a mental process) may not be subject to the same requirements.

¹³ See also *Diehr*, 450 U.S. at 184 (“Industrial processes ... are the types which have historically been eligible to receive the protection of our patent laws.” (emphasis added)); *Tilghman v. Proctor*, 102 U.S. 707, 722 (1880) (“A manufacturing process is clearly an art, within the meaning of the law.” (emphasis added)); *Cochrane v. Deener*, 94 U.S. 780, 788 (1876) (“A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.”).

¹⁴ See AT&T, 172 F.3d at 1355, 1358 (holding patentable “a process that uses the Boolean principle in order to determine the value of the PIC indicator” and that “require[d] the use of switches and computers”); *State Street Bank*, 149 F.3d at 1373 (“[W]e hold that the transformation of data ... by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm.” (emphases added)); *Alappat*, 33 F.3d at 1544 (“This is not a disembodied mathematical concept which may be characterized as an ‘abstract idea,’ but rather a specific machine to produce a useful, concrete, and tangible result.” (emphases added)); *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058-59 [22 USPQ2d

1033] (Fed. Cir. 1992) (holding patentable a method for analyzing electrocardiograph signals for the detection of a specific heart condition that used “electronic equipment programmed to perform mathematical computation”). However, mental processes—or processes of human thinking—standing alone are not patentable even if they have practical application. The Supreme Court has stated that “[p]henomena of nature, though just discovered, *mental processes*, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.” *Benson*, 409 U.S. at 67 (emphasis added). In *Flook* the patentee argued that his claims did not seek to patent an abstract idea (an algorithm) because they were limited to a practical application of that idea—updating “alarm limits” for catalytic chemical conversion of hydrocarbons. 437 U.S. at 586, 589-90. The Court rejected the notion that mere recitation of a practical application of an abstract idea makes it patentable, concluding that “[a] competent draftsman could attach some form of post-solution activity to almost any mathematical formula.” *Id.* at 590. Since all other features of the process were well-known, including “the use of computers for ‘automatic monitoring-alarming,’” the Court construed the application as “simply provid[ing] a new and presumably better method for calculating alarm limit values.” *Id.* at 594-95. The Court held the application unpatentable because “if a claim [as a whole] is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.” 437 U.S. at 595 (quoting *In re Richman*, 563 F.2d 1026, 1030 [195 USPQ 340] (CCPA 1977)).

Following the lead of the Supreme Court, this court and our predecessor court have refused to find processes patentable when they merely claimed a mental process standing alone and untied to another category of statutory subject matter even when a practical application was claimed. In *Schrader* we held unpatentable a “method constitut[ing] a novel way of conducting auctions” by allowing competitive bidding on a plurality of related items. 22 F.3d at 291. In doing so, we rejected the patentee’s argument that the process used a machine. Two of the alleged machines—a “display” in the front of the auction room and “a closed-circuit television system” for bidders in different cities—were not claimed by the patent, and the third—a “record” in which bids could be entered—could be “a piece of paper or a chalkboard.” *Id.* at 293-94. We therefore concluded that the patent impermissibly claimed unpatentable subject matter. Similarly, in *In re Warmerdam*, 33 F.3d 1354 [31 USPQ2d 1754] (Fed. Cir. 1994), we held unpatentable a process for controlling objects so as to avoid collisions because the key steps of “locating a medial axis” and “creating a bubble hierarchy” described “nothing more than the manipulation of basic

mathematical constructs, the paradigmatic ‘abstract idea.’” *Id.* at 1360. A machine was not required, *id.* at 1358, nor was there any indication that the process operated on a manufacture or composition of matter.

Decisions of our predecessor court are in accord. *In re Meyer*, 688 F.2d 789, 796 [215 USPQ 193] (CCPA 1982), held that “a mental process that a neurologist should follow” was not patentable because it was “not limited to any otherwise statutory process, machine, manufacture, or composition of matter.” *Id.* at 795. Similarly, *In re Maucorps*, 609 F.2d 481 [203 USPQ 812] (CCPA 1979), held that an invention “[u]ltimately ... directed toward optimizing the organization of sales representatives in a business” was unpatentable. *Id.* at 482, 486. *See also Alappat*, 33 F.3d at 1541 (“*Maucorps* dealt with a business method for deciding how salesmen should best handle respective customers and *Meyer* involved a ‘system’ for aiding a neurologist in diagnosing patients. Clearly, neither of the alleged ‘inventions’ in those cases falls within any §101 category.”).¹⁵

¹⁵ In *Musgrave*, our predecessor court concluded that the claims at issue in that case included non-mental steps and claimed patentable subject matter. 431 F.2d at 893. To the extent that language in the opinion might suggest that mental processes standing alone are patentable, the broad language in the opinion was significantly cabined by *Benson*. *See* 1 *Chisum on Patents* §1.03[6][c].

[2] It is thus clear that the present statute does not allow patents to be issued on particular business systems—such as a particular type of arbitration—that depend entirely on the use of mental processes. In other words, the patent statute does not allow patents on particular systems that depend for their operation on human intelligence alone, a field of endeavor that both the framers and Congress intended to be beyond the reach of patentable subject matter. Thus, it is established that the application of human intelligence to the solution of practical problems is not in and of itself patentable

To qualify as a statutory process, claims 15-17 and 20-24 should positively recite the other statutory class (the thing or product) to which it is tied, for example by identifying the apparatus that accomplishes the method steps, or positively recite the subject matter that is being transformed, for example by identifying the material that is being changed to a different state or thing. Nominal data gathering or post solution activity steps in the claimed subject matter will not be considered sufficient to convert a process that otherwise recites only mental steps into

statutory subject matter. Preamble limitations that require the claimed process to comprise machine implemented steps will not be considered sufficient to convert a process that otherwise recites only mental steps into statutory subject matter. The applicants are cautioned against introduction of new matter in an amendment.

Claims 18-19 and 25-30 are drawn to a computer program product on computer readable media. The specification states on page 57, second and third paragraphs, that one embodiment of a computer readable medium is a carrier wave signal. This embodiment of the claims read on non-statutory subject matter (In re Nuijten 84 USPQ2d 1495 (2007)). Applicant may overcome the rejection by amendment of the claims to be limited to physical forms of computer readable media described in the specification.

Claims 15-17 and 20-24 are drawn to a method and claims 18-19 and 25-30 are drawn to a computer readable medium and computer program product comprising code for executing a method. A statutory process must include a step of a physical transformation, or produce a useful, concrete, and tangible result (State Street Bank & Trust Co. v. Signature Financial Group Inc. CAFC 47 USPQ2d 1596 (1998), AT&T Corp. v. Excel Communications Inc. (CAFC 50 USPQ2d 1447 (1999)). The instant claims do not result in a physical transformation, thus the Examiner must determine if the instant claims include a useful, concrete, and tangible result.

As noted in State Street Bank & Trust Co. v. Signature Financial Group Inc. CAFC 47 USPQ2d 1596 (1998) below, the statutory category of the claimed subject matter is not relevant to a determination of whether the claimed subject matter produces a useful, concrete, and tangible result:

The question of whether a claim encompasses statutory subject matter should not focus on *which* of the four categories of subject matter a claim is directed to 2-- process, machine, manufacture, or composition of matter--but rather on the essential characteristics of the subject matter, in particular, its practical utility.

Section 101 specifies that statutory subject matter must also satisfy the other "conditions and requirements" of Title 35, including novelty, nonobviousness, and adequacy of disclosure and notice. See *In re Warmerdam*, 33 F.3d 1354, 1359, 31 USPQ2d 1754, 1757-58 (Fed. Cir. 1994). For purpose of our analysis, as noted above, claim 1 is directed to a machine programmed with the Hub and Spoke software and admittedly produces a "useful, concrete, and tangible result." *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557. This renders it statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss.

In determining if the claimed subject matter produces a useful, concrete, and tangible result, the Examiner must determine each standard individually. For a claim to be "useful" the claim must produce a result that is specific and substantial. For a claim to be "concrete" the process must have a result that is reproducible. For a claim to be "tangible" the process must produce a real world result. Furthermore, the claim must be limited only to statutory embodiments.

Claims 15-30 do not require production of a tangible result in a form that is useful to the user of the process, computer readable medium, or computer program product. The claims derive a linear classifier without requiring that the classifier result be outputted to a user in a user interpretable format. A tangible result requires that the claim must set forth a practical application to produce a real-world result. This rejection could be overcome by amendment of the claims to recite that a result of the process is outputted to a display, or to a user, or in a graphical format, or in a user readable format, or by including a result that is a physical transformation. The applicants are cautioned against introduction of new matter in an amendment.

Claims Rejected Under 35 U.S.C. § 112, Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claims 15 (line 4) and 18 (line 5) recite the limitation "the class". There is insufficient antecedent basis for this limitation in the claims as there is no previous mention of a class. Clarification of this issue via clearer claim wording is requested. Claims 16-17 and 19-30 are also rejected due to their dependency from claims 15 and 18.

Claims 19 and 25-30 recite the limitation "computer code product" in the first line of each claim. There is insufficient antecedent basis for this limitation in the claims. While there is previous mention of a "computer readable medium", there is no previous mention of a computer code product". Clarification of this issue via clearer claim wording is requested.

Claim Rejections – 35 USC §102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-19, 22-24, and 27-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Golub et al. (US 2003/0225526).

Golub et al. disclose a computer-based method and system and program with code for deriving a linear classifier for classifying a test gene expression dataset (abstract, 0007-0011, 0032, 0046, 0057, 0085, 0087, claim 16), inputting and providing a reference gene expression dataset comprising two subsets where one is labeled in the class (i.e. disease state) and the other is labeled outside the class (i.e. normal state) (0008, 0020, 0033, 0037, 0045-0048, 0107), and minimizing the value of a loss function on the reference gene expression dataset to derive a linear classifier capable of determining the classification of the test gene expression dataset as in the class or outside the class (abstract, 0045-0048, 0108-0114, 0020, Figure 3, 0035), as stated in instant claims 15 and 18. Golub et al. disclose using a chemogenomic dataset comprising gene expression levels measured in response to in vivo compound treatments (claim 18, 0013 (i.e. samples obtained at different time points before and after treatment to monitor treatment efficacy), 0051), as stated in instant claims 16 and 27. Golub et al. disclose using a support

vector machine (0045-0048, 0108-0114), as stated in instant claims 17 and 19. Golub et al. disclose data labeled in the class representing disease types, state resulting from drug treatment, and structural class of compounds (i.e. drugs) (abstract, 0013), as stated in instant claims 22-24 and 28-30.

Thus, Golub et al. anticipate instant claims 15-19, 22-24, and 27-30.

Conclusion

No claim is allowed.

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the PTO Fax Center. The faxing of such papers must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993) (See 37 CFR §1.6(d)). The Central Fax Center number for official correspondence is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carolyn Smith, whose telephone number is (571) 272-0721. The examiner can normally be reached Monday through Thursday from 8 A.M. to 6:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran, can be reached on (571) 272-0720.

October 15, 2008

/Carolyn Smith/
Primary Examiner
AU 1631